Code No: 155CV

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, January - 2025
POWER SYSTEM – II
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A
(25 Marks)

1.a)	Define distributed parameters.	[2]
b)	How do you classify the transmission line is to short, medium and long lines?	[3]
c)	Under what condition a synchronous motor takes a leading current.	[2]
d)	What are the disadvantages of tap changing transformers?	[3]
e)	Define the base value.	[2]
f)	What is the reactance diagram and give its application?	[3]
g)	What is the use of ground wire?	[2]
h)	How many types of lightning arresters are generally used in transmission lines? Name the best type?	[3]
i)	What is the need of fault analysis?	[2]
j)	What is the need of symmetrical components?	[3]

PART – B
(50 Marks)

2.a) Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation

b) Determine the sending end voltage and current of an 80km, 3-phase, 50Hz transmission line designed to deliver 24MVA at 0.8 p.f lagging at 6.6kV to a balanced load. The conductors are of copper each having a resistance of 0.105 ohm/km and an outside diameter of 1.5 cm. They are spaced equilaterally 1.5 meters apart. Use nominal-π method. [5+5]

OR

3.a) What is Ferranti effect? Deduce a simple expression for the voltage rise of an unloaded line.

b) Explain the procedure the draw the receiving end power circle diagram. [5+5]

4. Why voltage control is required in power systems? Mention the different methods of voltage control employed in power system. Explain one method of voltage control in detail giving a neat connection diagram. [10]

OR

5.a) Show with the aid of a vector diagram, how the Voltage at the receiving end of a transmission line can be maintained constant by the use of a synchronous phase modifier.

b) Explain the compensated transmission line. [6+4]

6.a) Explain the procedure for drawing single line diagram of a power system.

b) Three generators are rated as follows:
Generator 1: 100 MVA, 33 kV, reactance-10%
Generator 2: 150 MVA, 32 kV, reactance-8%
Generator 3: 110 MVA, 30 kV, reactance-12%
Determine the reactance of the generators corresponding to base values of 200 MVA and 35 kV. [4+6]

OR

7.a) When the transmission line is terminated by the resistive load, how do you find out the expressions of reflected voltage and current wave.

b) An 400kV, 2.5μSec rectangular surge travels along the line terminated by an capacitance of 2600pF. Determine the voltage across the capacitance and reflected voltage wave if the surge impedance of the line is 420 ohms. [5+5]

8.a) Discuss the various internal and external causes of over voltages in a power system.

b) Explain the working and relative merits and demerits of expulsion arrester and Valve arrester. [5+5]

OR

9.a) What is Horn gap arrester? Explain how it works. What is the purpose of inserting a resistance between horn gap arrester and the line?

b) Why is insulation co-ordination needed in a large power system? What is mean by basic impulse level of an equipment? [5+5]

10.a) Derive an expression for the total power in a 3-phase system in terms of the sequence components of voltage and currents.

b) What do you understand by sequence networks? What is their importance in unsymmetrical fault calculations? [5+5]

OR

11.a) How are reactors classified? List out the merits and demerits of different types of system protection using reactors

b) Derive the expression for the fault current when L-L-G fault occurs at the terminals of a un loaded alternator and draw its equivalent circuit. [5+5]

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